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10 CFR 50.73

W3F1-2005-0070

October 27, 2005

U.S. Nuclear Regulatory Commission  
Attn: Document Control Desk  
Washington, D.C. 20555

Subject: Licensee Event Report 2005-004-00  
Waterford 3 SES  
Docket No. 50-382  
License No. NPF-38

Dear Sir or Madam:

Attached is Licensee Event Report (LER) 2005-004-00 for Waterford Steam Electric Station Unit 3. This report provides details of the loss of offsite power during Hurricane Katrina and is being submitted in accordance with 10 CFR 50.73 (a)(2)(iv)(A) and 10CFR10.73 (a)(2)(v)(A,B, & D).

There are no commitments contained in this submittal. If you have any questions, please contact Ron Williams at (504) 739-6255.

Very truly yours,

A handwritten signature in cursive script, appearing to read "Ron Williams".

RJM/RLW/

Attachment

IE22

cc: Mr. Bruce S. Mallett  
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## LICENSEE EVENT REPORT (LER)

(See reverse for required number of  
digits/characters for each block)

Estimated burden per response to comply with this mandatory collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Service Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to [infocollects@nrc.gov](mailto:infocollects@nrc.gov), and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

1. FACILITY NAME Waterford Steam Electric Station, Unit 3	2. DOCKET NUMBER 05000-382	3. PAGE 1 OF 6
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4. TITLE Loss of Offsite Power During Hurricane Katrina
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5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
08	29	2005	2005	- 004 -	00	10	27	2005	N/A	05000
									FACILITY NAME	DOCKET NUMBER
									N/A	05000

9. OPERATING MODE  3	11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§: (Check all that apply)									
	<input type="checkbox"/> 20.2201(b)	<input type="checkbox"/> 20.2203(a)(3)(i)	<input type="checkbox"/> 50.73(a)(2)(i)(C)	<input type="checkbox"/> 50.73(a)(2)(vii)						
	<input type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)						
	<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 20.2203(a)(4)	<input type="checkbox"/> 50.73(a)(2)(ii)(B)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)						
	<input type="checkbox"/> 20.2203(a)(2)(i)	<input type="checkbox"/> 50.36(c)(1)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(ix)(A)						
	<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 50.36(c)(1)(ii)(A)	<input checked="" type="checkbox"/> 50.73(a)(2)(iv)(A)	<input type="checkbox"/> 50.73(a)(2)(x)						
	<input type="checkbox"/> 20.2203(a)(2)(iii)	<input type="checkbox"/> 50.36(c)(2)	<input checked="" type="checkbox"/> 50.73(a)(2)(v)(A)	<input type="checkbox"/> 73.71(a)(4)						
10. POWER LEVEL  N/A	<input type="checkbox"/> 20.2203(a)(2)(iv)	<input type="checkbox"/> 50.46(a)(3)(ii)	<input checked="" type="checkbox"/> 50.73(a)(2)(v)(B)	<input type="checkbox"/> 73.71(a)(5)						
	<input type="checkbox"/> 20.2203(a)(2)(v)	<input type="checkbox"/> 50.73(a)(2)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(v)(C)	<input type="checkbox"/> OTHER						
	<input type="checkbox"/> 20.2203(a)(2)(vi)	<input type="checkbox"/> 50.73(a)(2)(i)(B)	<input checked="" type="checkbox"/> 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A						

## 12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME Ronald L. Williams, Licensing Engineer	TELEPHONE NUMBER (Include Area Code) 504-739-6255
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## 13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX

## 14. SUPPLEMENTAL REPORT EXPECTED

☐ YES (If yes, complete 15. EXPECTED SUBMISSION DATE)☒ NO

## 15. EXPECTED SUBMISSION DATE

MONTH	DAY	YEAR

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)

On August 29, 2005 at 07:59, a Loss of Offsite Power (LOOP) occurred with the plant in Mode 4. At the time of the LOOP, the plant site was experiencing tropical storm winds of approximately 48 miles per hour. All loads supplied by the non-safety 6.9 kV busses were lost including the Reactor Coolant Pumps 1A, 1B, 2A and 2B. The two emergency diesel generators (EDG) started in response to the LOOP conditions and safe shutdown loads were sequenced onto the two safety busses. Offsite power was available on August 31, 2005; however, Waterford 3 continued to run the safe shutdown loads on the EDGs as grid restoration progressed. After analysis of the surrounding infrastructure and continuing grid restoration activities, the decision was made to cool the plant down to Mode 5 on September 1, 2005. Following grid evaluations, offsite power for Train A was declared OPERABLE at 23:21 on September 1, 2005 and offsite power for Train B at 22:20 on September 2, 2005.

The loss of offsite power occurred due to the Entergy transmission system damage caused by Hurricane Katrina. Following continued grid and infrastructure restoration activities and authorization to resume operation by the NRC and Federal Emergency Management Agency (FEMA), the plant was returned to service on September 13, 2005 at 12:16. This condition did not compromise the health and safety of the public or plant personnel.

## LICENSEE EVENT REPORT (LER)

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## 17. NARRATIVE (If more space is required, use additional copies of NRC Form 366A)

## REPORTABLE OCCURRENCE

On August 29, 2005 at 07:59, a Loss of Offsite Power (LOOP) occurred with the plant in Mode 4. At the time of the LOOP, the plant was experiencing the effects of tropical storm force winds. The NRC Operations Center was notified of this condition on August 29, 2005 at 08:08 due to the LOOP in accordance with 10 CFR 50.72(a)(1)(ii). This condition is being reported in accordance with the following 60-day written reporting requirements:

1. 10 CFR 50.73(a)(2)(iv)(A) due to the automatic actuation of the emergency AC electrical power systems.
2. 10 CFR 50.73(a)(2)(v)(A, B, and D) due to the loss of offsite power that could have prevented the fulfillment of the safety function of structures or systems that are needed to shutdown the reactor and maintain it in a safe shutdown condition, remove residual heat, and mitigate the consequences of an accident. Technical Specification (TS) 3.8.1.1.a Limiting Condition for Operation (LCO), which requires two physically independent circuits between the offsite transmission network and the onsite Class 1E distribution system, was not met.

## INITIAL CONDITIONS

On August 27, 2005 at 22:04 Waterford 3 declared an unusual event based on issuance of a Hurricane Warning for St. Charles Parish by the National Weather Service. On August 28, 2005 at 10:59 Waterford 3 commenced an orderly shutdown in accordance with Off Normal Operating procedure OP-901-521, Severe Weather and Flooding, in anticipation of a Loss of Off-Site Power due to the approach of Hurricane Katrina, a Category 4 hurricane on the Saffir-Simpson scale. The reactor was manually tripped at 13:16 and a cooldown was commenced at 17:05 with the plant entering Mode 4 at 20:58 on August 28, 2005. The plant experienced a voltage excursion to 236kV at 02:54 on August 29, 2005. At 06:24 offsite power was declared inoperable due to system voltage exceeding 241kV and TS 3.8.1.1 ACTION STATEMENT 'e' was entered. At 07:45, the plant experienced a loss of instrument air pressure [LD] due to lowering grid voltage and Off Normal Operating procedure OP-901-511, Instrument Air Malfunction, was entered. At 07:59 with the plant in Mode 4, the plant experienced a Loss of Offsite Power (LOOP) and Emergency Operating procedure OP-902-003, Loss of Offsite Power/Loss of Forced Circulation Recovery procedure, was entered.

In anticipation of the loss of offsite power and the need to rely on the emergency diesel generator onsite power supply, temporary portable diesel generators were brought onsite on August 28, 2005 and installed with the capability of being manually connecting to one of the safety busses if its associated plant EDG was lost.

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## EVENT DESCRIPTION

## BACKGROUND

The arrangement of the Waterford 3 switchyard [FK] is presented in Figure 1. The physical configuration of the Waterford 3 Switchyard (SWYD) and Switching Station (SWSTA) is designed to minimize degraded switchyard conditions. The Waterford 3 SWYD uses a breaker and half scheme with East and West busses. Waterford 3 is connected to the utility grid by two transmission lines [FK] to the Waterford 3 - 230 kV Switchyard via the Switching Station [FK]. Each line is designed to carry the full load required for safe shutdown of the plant. Each line can carry 100% output of the main generator. Transmission lines to the Waterford 3 SWSTA from the SWYD are each tied to the busses by one dedicated breaker (double bus double breaker scheme). These two 230 kV transmission lines, along with the 6.9 kV busses and bays connecting the Waterford 3 - 230 kV SWYD with the Waterford 3 SWSTA, are addressed in Waterford 3 TS 3.8.1.1 Limiting Condition for Operation (LCO) as the two physically independent circuits between the offsite transmission network and the onsite Class 1E distribution system that are required operable in Modes 1, 2, 3, and 4.

The Waterford 3 - 230 kV Switchyard also has several other 230 kV transmission lines connected to it. Three of these transmission lines connect Waterford Units 1 and 2 to the Switchyard. Three of the transmission lines cross the river on two separate river crossing towers to tie into the Little Gypsy 230 kV Switchyard. There is a 230kV tie to the adjacent 500kV Switchyard. There are other transmission lines which tie to other areas of the Entergy grid. The system is designed such that no transmission lines cross the 230kV lines connecting the Waterford 3 switching station to the Waterford 3 230kV Switchyard. A single failure such as spurious protective relay operation, breaker failure or transmission line failure associated with the offsite power source will be limited to one train of offsite power only.

## EVENT

On August 29, 2005, the plant was in Mode 4 with the reactor coolant loops filled; two Reactor Coolant Pumps (RCP) [AB:P] 1B and 2B were operating as well as Shutdown Cooling (SDC)[BO] Train A. Due to the approach of Hurricane Katrina, several electric plants that connect to the SWYD via 230kV transmission lines were shutdown e.g. Little Gypsy Units, Waterford Units 1 & 2, Ninemile Units, and the Dow (formerly Union Carbide) facility. At 07:59, the LOOP occurred. At the time of the LOOP, the plant site was experiencing tropical storm winds of approximately 48 miles per hour. All loads supplied by the non-safety 6.9 kV busses were lost including the RCPs 1B and 2B. However, RCP 2B breaker failed to trip. Details of the RCP failure to trip are discussed in the "Related Equipment Issues" section of this report. The two emergency diesel generators (EDG) started in response to the LOOP conditions and safe shutdown loads were sequenced onto the two safety busses. Following successful load sequencing onto the EDGs, SDC Train A was placed back in service at 08:15. The plant safety loads remained energized from the two EDGs with temporary diesel generators installed and capable of being manually connected to one of the safety busses if its associated plant EDG was lost.

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## 17. NARRATIVE (If more space is required, use additional copies of NRC Form 366A)

## EVENT (continued)

On 8/30/2005 at approximately 18:00, plant experienced a major loss of emergency preparedness offsite communications [FI] capability because of the loss of Reactor Auxiliary Building (RAB), Emergency Operations Facility (EOF) telecommunication switches, and the Operational Hotline and NRC ENS lines. The Offsite communications remaining available were the industrial hotline, civil defense radio, satellite telephones and cellular telephones. This loss of offsite communications capability was reported to the NRC under 10 CFR 50.72(a)(1)(i) at 20:20, as part of the existing Unusual Event declaration.

Grid restoration activities continued due to the transmission network in the vicinity of Waterford 3 having damaged towers and limited connections. The 230 kV transmission lines from Waterford 3 Switchyard to Waterford 3 Switching Station remained intact during the hurricane and did not require any work for restoration of offsite power. Waterford 3 continued to run its safe shutdown loads on the EDGs as grid restoration progressed. Following analysis of the surrounding infrastructure and grid capabilities, the decision was made to cool the plant down to Mode 5. The plant transitioned to Mode 5 at 14:18 on September 1, 2005. Grid evaluations were performed to consider transfer of safety busses from onsite emergency power sources (EDGs) to the preferred offsite power sources. The evaluations concluded that safety busses could be reconnected to offsite power; however, to maintain diversity and conservatism, only one train of shutdown equipment was connected to offsite power source until the grid was further strengthened with additional spinning reserves. Train A offsite power source was available at approximately 19:00 and declared operable at 23:21 on September 1, 2005. Following additional grid evaluations, Train B offsite power source was available at 21:54 and declared operable at 22:20 on September 2, 2005. The plant remained shutdown pending continued grid and infrastructure restoration activities and the results of the NRC and Federal Emergency Management Agency's (FEMA) restart readiness inspection.

Emergency Preparedness offsite communications capability that was previously lost had been reestablished through the use of a functional Operational Hotline, a dedicated open line to the NRC to replace the Emergency Notification System (ENS) and the routing of key plant telephone numbers through Little Rock, AK. Because of the restoration of communication circuits, the Unusual Event was terminated at 17:40 on September 7, 2005.

Following satisfactory completion of the NRC and FEMA's restart readiness inspection and authorization to resume operation on September 9, 2005; plant startup commenced. The plant was synchronized to the grid at 12:16 on September 13, 2005.

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## RELATED EQUIPMENT ISSUES

1. During the LOOP, RCP 2B 6.9kV breaker [EA] failed to trip. The breaker was manually opened and racked out. Investigation into the failure determined the shunt trip coil failed open electrically. A review of past failure trends and operating experience for this model breaker determined there is no adverse trend of GE Magne-Blast circuit breaker failures nor misaligned trip coils that could prevent breakers from tripping at Waterford 3. There are no generic implications and the failure of the shunt trip coil is judged to be a random failure and not age related due to the low number of cycles experienced by the breaker.

## CAUSAL FACTORS

The Loss of Offsite Power occurred due to the Entergy transmission system damage caused by Hurricane Katrina.

## CORRECTIVE ACTIONS

The grid in the vicinity of Waterford 3 had limited connections and could have been subjected to voltage and frequency variations due to grid restoration efforts. The 230 kV transmission lines from Waterford 3 Switchyard to Waterford 3 Switching Station remained intact during the hurricane and did not require any work for restoration of off site power. Close coordination was established between the Entergy Transmission System operator and Waterford 3 personnel to evaluate the capability of the offsite power sources to support plant safe shutdown loads. Grid evaluations were performed prior to major plant evolutions to ensure grid frequency was within acceptable range and grid voltage was above the minimum acceptable voltage (223kV) at the Waterford 3 SWSTA. These evolutions consisted of the following examples: (1) Transfer of safe shutdown plant loads on the onsite emergency power sources to the offsite power sources; (2) Starting and operating large auxiliary motors on the grid; (3) Plant startup; (4) Power ascension; and (5) Power operation.

## SAFETY SIGNIFICANCE

The Loss of Offsite Power event is safety significant, however, the switchyard system did operate as designed and disconnected transmission circuits from the switchyard busses when the integrity of the grid was challenged by the environmental conditions present during Hurricane Katrina. The plant was shutdown to Mode 4 in anticipation of a LOOP. The control room operators were prepared for losing the RCPs and taking appropriate action while on natural circulation to restart SDC. The EDGs started and aligned to the safety busses as designed and thus provided electrical power for other accident mitigating systems.

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## SAFETY SIGNIFICANCE (continued)

There was no significant equipment problems noted while maintaining shutdown conditions during and after the hurricane. If the EDGs were lost during operation, the temporary diesel generators, which were brought onsite prior to the hurricane landfall, could have been connected to one of the safety busses to maintain safe plant shutdown conditions. Based on the above, this event did not have a significant effect on the health and safety of the public.

## SIMILAR EVENTS

A review of events occurring within the past three years did not identify any previous similar occurrences.

## ADDITIONAL INFORMATION

Energy Industry Identification System (EIIIS) codes are identified in the text within brackets [ ].

**FIGURE 1**  
Waterford 3 Switchyard Arrangement

